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ABSTRACT

Cross sectional data indicate that about four percent of elderly persons reside in nursing homes. Yet many studies, some using death certificates, show actual risk of institutionalization is upwards of 25 percent. This paper presents a death registration study that examined all deaths in North Carolina and analyzed rural and urban differences. The results indicated that the urban elderly were not, in practical terms, more likely than the rural elderly to die in hospitals and long term care facilities. Rural elderly who died in a hospital or nursing home were more likely to die in a facility outside their county of residence than were their urban counterparts. The lack of facilities may force the elderly to leave their county of residence. Rural elderly were not more likely than urban elderly to die at home or outside of health facilities. However, this does not necessarily mean rural elderly do not enjoy stronger support networks than do their urban counterparts. The introduction of a nursing home into a rural county was related to a drastic reduction in the number of deaths which occurred in hospitals outside of the county and an increase in the number of long term care facility deaths. The introduction of a local nursing home, however, did not affect the percent of in-home deaths. Several tables are included. (ABL)

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FOUR PERCENT FALLACY REVISITED:

URBAN AND RURAL DIFFERENCES

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ABSTRACT

Cross sectional data indicates about four percent of elderly reside in nursing homes. Yet many studies, some using death certificates, show actual risk of institutionalization is upwards of 25 percent. This death registration study adds unique features to the literature. 1) It reports on all deaths in a state rather than just an urban sample. 2) It provides a rural-urban comparison.

North Carolina 1983: 14.7 percent of deaths among those 65 and over occurred in Long Term Care Facilities (LTCF). Rural elderly (non-SMSA) were slightly less likely to die in a LTCF (13.1 percent vs 16.5 percent) and slightly more likely to die in an acute care hospital (70.8 percent vs 66.7 percent) than urban elderly. Rural elderly also are more likely to die in facilities outside of their home county than urban elderly: LTCF (35.1 percent vs 17.5 percent) and hospital (32.7 percent vs 17.5 percent). Based on lack of facilities and hypothesized greater availability of family and neighbor support more home deaths or deaths outside of health care facility were expected in rural areas; yet only a slight difference was found--16.1 percent rural vs 16.8 percent SMSA deaths were of this type. It is possible that the rural elderly stay at home longer; then close to death are hospitalized. In all, though, the greatest difference urban and rural risk of institutionalization appears to be if it occurs in the elderly's county of residence.

INTRODUCTION

Most gerontologists are familiar with the so-called four percent fallacy (Kastenbaum and Candy, 1973). In an effort to break down one of the myths of aging, students in classes on aging and the general public are often told that only about four percent of those 65 years old and over reside in institutional settings. An example of this is found in Palmore's (1977) first Facts on Aging Quiz. The four percent figure is used to indicate that only a small percent of our older population has succumbed to the problems often associated with old age to the point they are dependent and require institutionalization. The discussion of this figure may help to put aside the myth of widespread feebleness and dependency in old age but could create the myth that few older adults will ever face institutionalization.

Approximately 4.8 percent of the elderly are found in long term care facilities at any moment in time (U. S. Department of Health and Human Services, 1977). Cross-sectional data, though, does not speak to lifetime risk of institutionalization. And aging is a longitudinal process. Few older adults at any one moment might be institutionalized. Yet the inevitable process of senescence progressively reduces viability and increases vulnerability of aging adults. This process in turn produces

greater dependency and risk of institutionalization. Hence, lifetime risk of institutionalization is much greater than 4.8 percent. While the cross-sectional data is valid, if it is not interpreted properly, it can be deceptive. Such cross-sectional data can lead the casual observer to believe only a small minority of the elderly will ever reside in a nursing home and, therefore, feel priority should be given to issues which effect a greater number of older adults. It is reassuring that most introductory texts in social gerontology point out this fallacy.

LITERATURE REVIEW

Kastenbaum and Candy (1973) first alluded to the potential of the four percent fallacy. This initial study on lifetime risk of nursing home placement used obituaries and death certificates from the metropolitan Detroit area in 1971 to estimate where those age 65 years old and over die. The obituary data reveals 13.3 percent died in nursing homes. Data from death certificates reveal 20 percent of the elderly died in nursing homes and another 3.7 percent of the deaths occurred in other types of long term care facilities. The authors indicate this is an underestimation as it does not include those who were in long term care facilities and were transferred to hospitals and died. Some 62.4 percent of the deaths in this study occurred in hospitals.

Wershow (1976) reports on data from four nursing homes in Birmingham, Alabama, and the surrounding county. The work

demonstrates a high turnover of patients in nursing homes which arises out of deaths that occur shortly after admissions. The author argues this high turnover produces an under-count in the cross-sectional data.

Duke's first longitudinal study (1955 to 1976) was used by Palmore (1976) to estimate the lifetime chance of institutionalization. Of 207 individuals in the study, 45 individuals died in an institution and 9 died after leaving a nursing home. The author acknowledges that the lifetime risk of 26 percent found in the group may be limited by the sampling selection of who might participate in a longitudinal study and the geographic area, central region of North Carolina. Palmore further reports institutionalization is related to living alone, being single or separated, or having few or no children, being female and white.

Data from the National Center for Health Statistics' national studies (1963, 1969, 1973-74) of long term care facility residents was used in Ingram and Barry's work (1977). From the three studies, the data show respectively 2.6, 3.6, and 4.6 percent of the population age 65 and over resided in a nursing home. Yet of all of the mortality in the 55 and over age group, 10.5, 19.8, and 21.1 percent of deaths occurred in long term care facilities in 1963, 1969, and 1973-74 respectively.

Lesnoff-Caravglia's (1978) replication of Kastenbaum and Candy's earlier study used data from Springfield, Illinois, in

1975. Nineteen percent of the death certificates showed deaths occurring in a nursing home. An additional 11 percent of the deaths were found to have occurred in some other form of a long term care facility. This study also reported that hospital deaths accounted for 54 percent of the deaths.

Another longitudinal study was conducted by Vicente, Wiley, and Carrington (1979). The study started in 1965 with 6,928 Alameda County (Berkeley/Oakland, California) residents. A total of 521 of individuals who were age 55 and over at the beginning of the study had died by 1975. Data could be collected on 455 of the decedents and of these 28.9 percent resided for some time in a nursing home before their deaths. Data also revealed older white women who lacked social support were more likely to have resided in a nursing home.

McConnel (1984) reviews past studies and questions the inadequacy of both the death certificate and longitudinal methodology. Death certificates underestimate the residency in nursing homes as they do not address those who had resided in a long term facility at some time but died elsewhere. Data from Keeler, Kane, and Solomon (1981) indicate this can be a severe underestimation. Longitudinal methods do not take into account that institutionalization rates have increased over the years. Chances of being institutionalized then increased from the beginning to the end of the two studies mentioned earlier. In an

attempt to constrain these under-estimations, life table methodology is applied to occurrences of institutionalization. This mechanism estimates lifetime risk of institutionalization of 48.2 percent and 63 percent at birth and at age 65 respectively.

Finally, Liang and Tu (1986) critique the last piece mentioned. They point out some issues with McConnel's use of life table analysis. The researchers then utilize a different approach to the life table and report the lifetime and age 65 risk of institutionalization of 29.7 and 35.6 respectively. The latter figure is closer to the reports from the previous two death certificate studies and the longitudinal works.

Clearly the literature indicates the risk of institutionalization in later life is much higher than cross-sectional data would lead one to suspect. Two of the studies report the risk of institutionalization is higher among certain social groups. An extension of this work is to compare risk of long term care facility placement in urban versus rural settings. Except for the two studies utilizing national data, the research reported in the literature draws data from various large metropolitan areas or in the case of Palmore (1977) from a section of a state with a mixture of rural and urban areas. This study adds to the literature in that it reports data on a whole state and allows for an urban and rural comparison.

Population density is expected to be an important variable.

Rural areas often lack hospitals and nursing homes which means residents may not access such facilities or they must leave the county to use such facilities. Even if the rural area has a hospital, older adults with multiple chronic conditions and in very serious condition may be transferred to an urban hospital. The urban setting affords the older patient more sophisticated technological care which is supported by the greater population density. Again, even if a rural county may have a nursing home or two and if the facility faces excess demand, potential patients may be sent to urban areas where there exists a greater chance of obtaining a nursing home placement in one of the many facilities that operate in an urban area.

Another mechanism that may be at work is a greater informal support system and value orientation in rural areas which lends itself to more older adults dying at home rather than being institutionalized. The gemeinschaft value structure and the tie to the land may be more supportive to an extended family and greater neighbor relations which in turn may help maintain older adults in their home rather than turn to institutionalization.

Specifically, this paper will test the following hypotheses concerning the location of death for older adults.

1. Urban areas in comparison to rural areas will have a higher percentage of deaths of the elderly in health care facilities.

a. A higher percent of urban versus rural elderly will die in hospitals.

b. A higher percent of urban versus rural elderly will die in nursing homes and other long term care facilities.

2. Older adults residing in rural areas are more likely to die in facilities outside of their county of residence than their urban counterparts.

3. It is expected that rural older adults are more likely to die at home.

4. The introduction of a nursing home in a rural county will alter the pattern in the place of death which had previously existed.

   a. There will be fewer deaths in hospitals.

   b. There will be fewer deaths in nursing homes outside of the county.

   c. There will be fewer deaths in the home.

METHODOLOGY

The North Carolina Center for Health Statistics provided data on all death registrations in 1980 and 1983. Four other variables were obtained from the states' computerized files. First, an age dichotomy of 65 and over versus 64 and younger was used. Then it was noted if the deceased was a resident of a county in a Standard Metropolitan Statistical Area (SMSA) or a

resident of a non-SMSA county. Next, the data indicated whether the resident died in or out of their county of residence.

Finally, deaths were classified as occurring in one of ten types of locations. To facilitate analysis, the state's system was collapsed into three groupings. An acute or short stay hospital category was constructed which consists of the General and Veteran's Administration Hospitals' classification. Next, a death was considered to be in a long term care facility if it occurred in a Nursing/Rest Home, in a Tuberculosis, Mental, Chronic, or Penal Hospital or it was in the other institution category. The last group was for deaths which occurred at home or outside of health care facilities and other institutional setting; North Carolina reports this last grouping together. The few individuals who died in a doctor's office and clinics were excluded from the analysis (38 out of N=32,895 in 1983 and 32 out of N=29,802 in 1980).

The three categories are fairly logical grouping. Yet even if other grouping of the hospitals and long term care facilities were suggested, it would make little difference in the data. The raw data is found in Appendix A through B. A review of the appendixes reveals relatively few of the deaths among the elderly occur outside of general hospitals, nursing/rest home, and home/non-institution settings category. Even the Veteran's Administration setting which is the largest of all the minor

categories comprises only 3.5 percent of the overall acute hospital category. So the effect of these minor categories on the overall analysis is negligible.

Existing data sources are relatively easy to obtain but do carry limitations. Predetermined data classification schemes may not always serve the researchers exact purpose. In this case, the place of death classification mechanism presents two minor problems. First, it is impossible to get an exact count of deaths occurring in the home as they are combined with those deaths that occurred outside of a home in a non-institutional and non-health care setting. Second, deaths in long term care facilities which are a part of a Veterans Administration (VA) hospital are counted as occurring in the VA hospital. Again, even if one-half of the VA dead were long term care facility deaths, their impact on overall analysis would be small and conservative, holding down the estimate of long term care facility deaths. Of course, the problem mentioned in the literature of underestimating long term care facility residents using death certificates also exists in this study. The limitations are conservative in nature and in general produce underestimations of expectancies for institutionalization. These limitations should be kept in mind in this exploratory study of rural and urban difference in the place of death.

The data reported here is from a census and not a sample.

Technically then, the need for inferential statistics is eliminated. Difference of proportion tests were calculated for all of the following comparisons and as may well be expected with such a large number of cases even the slightest difference proved to be statistically significant at p = .001 or higher.

RESULTS

Overall in 1983, 14.7 percent of the deaths in the sixty-five and over age group occurred in long term care institutions compared to 16.4 in 1980. The number of deaths in urban and rural areas are fairly evenly split in 1983 with 47.3 percent occurring in an SMSA and 52.7 percent in non-SMSA counties and 47.4 percent vs 52.6 percent in 1980. A review of Table 1 and Table 2 shows that with the exception of slight shift away from nursing home and other long term care facilities toward home/ non-institution and hospital deaths from 1980 to 1983, the tables are comparable. Hence, further analysis will focus on the most recent data.

Older individuals in counties within an SMSA are slightly more likely to die in a nursing home or other type of long term care facility (16.5% vs. 13.1%) than those living in non-SMSA counties. Yet urban elderly are slightly less likely to die in a hospital (66.7% vs. 70.8%) than their rural counterparts. There was practically no difference between rural and urban areas in home and non-institutions deaths (16.8% vs. 16.1%).

In regards to dying outside of their county of residence, clear differences are demonstrated between rural and urban elderly (28.2% vs. 14.8%). When comparing either hospital or institutional death, the rural elderly are more likely to die outside of their county of residence than their urban counterparts. Among rural elderly, 35.1 percent of those who died in a long term care facility did so outside of their county of residence compared to 17.5 percent of the urban group. In a similar manner, 32.7 percent of the older adults from rural counties died in a hospital outside their county, while for urban elderly the figure was again 17.5 percent. In terms of dying in home or a non-institutional setting, most older adults do so in their county of residence; and there is little difference between rural and urban populations (98.6% percent vs 97.8%).

A case study was performed on data from this larger study. An SMSA county, 1980 population size 160,934 and a non-SMSA county, 1980 population size 16,825 are compared for changes between 1980 and 1983. The two counties are in the western portion of the state and are contiguous. The larger county has 12 nursing homes totaling 861 beds, along with the following hospitals: two acute care, two psychiatric, a rehabilitation, a state run long term care, and a Veteran's Administration. The non-SMSA county does not have a hospital and did not have a nursing home in the county in 1980 but by the end of 1983 the

county had had a facility operating for a little over two years with 100 beds.

Data on the rural county is presented in the third table. First, note the rural county with a very low population density has a higher proportion of home/non-institution deaths than the statewide non-SMSA data revealed. Of greatest interest though, is that the new nursing home in the county is not associated with a significant downward shift in home/non-institutional deaths (23.7%-1980 vs 21.2%-1983). Rather there was a large downward shift in the proportion of county residents dying in the hospitals outside of the county (62.3%-1980 vs. 43.3%-1983; $P < .001$). Accompanying this downward shift in hospital deaths, there was an increase in the number of deaths that occurred in nursing homes (14%-1980 vs 35.6%-1983; $P < .001$). Most (70.3%) of the residents of the rural county who died in a nursing home or other long term care facility did so in the new facility in their county. Table 4 provides a point of comparison with the adjoining SMSA county. The overall proportion of deaths by place between 1980 and 1983 remains relatively stable in comparison to its rural neighbor which obtained a nursing home.

CONCLUSIONS

How does the data fit the hypotheses which guided this exploratory study? The first hypothesis which predicted urban elderly are more likely to die in hospitals and long term care

facilities had mixed results and was not strongly demonstrated. Urbanites were more likely to die in nursing homes but not in hospitals as the hypothesis predicted. It is fair to note that while the differences are significant, as this is data from a population, the practical difference in both cases was not that large. A possible explanation for this configuration of the data is that the lack of long term care facilities in the rural counties keep older adults in their homes longer until some incident forces hospitalization and death occurs.

As predicted by the second hypothesis, when the rural elderly die in a hospital and nursing home, they are more likely to die in a facility outside their county of residence than their urban counterparts. The lack of facilities force older adults to leave their county of residence. The percentage of difference for the rural versus urban elderly is approximately the same for hospitals and long term care facilities.

The third hypothesis about rural elderly more likely to die in home or outside of health facilities was not supported by the statewide data. The very rural county used as a case study did have a larger percent of home/non-health care facilities than overall non-SMSA grouping. Yet a hypothesis test found this difference slightly beyond acceptable levels $p = .08$. Just because rural elderly appear to die as frequently as urbanites in home and non-health facilities does not necessarily mean the

rural elderly do not enjoy stronger support network than their urban counterparts. It is possible rural elderly are staying at home longer, then upon acute episode, they go to a hospital and die there.

The last research question was well supported by the data. The introduction of a nursing home into a rural county altered the pattern in the place of death although not quite as expected. A drastic reduction in the number of deaths which occurred in hospitals outside of the county and an increase in the number of long term care facility deaths followed the construction of a nursing home in the county. It almost appears some individuals who had been sent to hospitals outside the county in the past were now being placed in the local nursing home. Yet, little change occurred in the percent of in-home deaths followed the opening of the nursing home.

A final point about the data should be noted. Overall, the state-wide data on the percent of deaths which occur in a nursing home is much lower than reported by studies in the urban north and west. It should be noted that even if just the other death certificate studies were considered, they were conducted at a time when institutionalization rates were lower. Hence, there may be even a greater difference in rates if the time frames were comparable. Institutionalization rates may be lower in the south or nursing homes in the south may be quicker to transfer acutely

ill patients to the hospital where they die and under this methodology are counted as hospital deaths.

Probably the two most important finding of this study of rural-urban differences are the following. First, rural elderly are more likely to die outside the county in which they lived. Certainly, some of the elderly dying outside of their county of residence are going to hospitals and long term care facilities in counties where some family and friends reside. It is probably more likely that going to a health facility outside their county of residence produces financial and social costs on their social support network. Second, the availability of health care facilities does not reduce the percentage of home deaths among the elderly in either urban or rural settings, yet this does not address the issue if the rural elderly are staying at home longer.

TABLE 1

PLACE OF DEATH ALL INDIVIDUALS AGE 65 & OVER IN NORTH CAROLINA

1983

Place of Death	SMSA Number	SMSA %-Total	SMSA %-Place In vs Out	NON-SMSA Number	NON-SMSA %-Total	NON-SMSA %-Place In vs Out
1. Short Stay Hospital	10,362	66.7		12,268	70.8	
a. in county of residence	8,552		82.5	8,259		67.3
b. out of county of residence	1,810		17.5	4,009		32.7
2. Nursing/Rest Home & Other LTCF*	2,563	16.5		2,271	13.1	
a. in county of residence	2,114		82.5	1,474		64.9
b. out of county of residence	449		17.5	797		35.1
3. Home or Non-Institution	2,608	16.8		2,785	16.1	
a. in county of residence	2,572		98.6	2,724		97.8
b. out of county of residence	36		1.4	61		2.2
Total of Places Line 1, 2, 3	15,533	47.3		17,324	52.7	
Died in County of Residence			85.2			71.9
Died Outside of County of Residence			14.8			28.1

*Other Long Term Care Facilities (LTCF) include Tuberculosis, Mental, Chronic, Penal Hospitals and Other Institutions.

NOTE: An additional 38 individuals died in doctors' offices and clinics in 1983. See Appendix A for exact distribution of place.

TABLE 2

PLACE OF DEATH ALL INDIVIDUALS AGE 65 & OVER IN NORTH CAROLINA

1980

Place of Death	SMSA			NON-SMSA		
	Number	%-Total	%-Place In vs Out	Number	%-Total	%-Place In vs Out
1. Short Stay Hospital	9,289	65.8		11,202	71.5	
a. in county of residence	7,481		80.5	7,623		68.1
b. out of county of residence	1,808		19.5	3,579		31.9
2. Nursing/Rest Home & Other LTCF*	2,682	19.0		2,193	14.0	
a. in county of residence	2,177		81.2	1,386		63.2
b. out of county of residence	505		18.8	807		36.8
3. Home or Non-Institution	2,141	15.2		2,263	14.5	
a. in county of residence	2,105		98.3	2,198		97.1
b. out of county of residence	36		1.7	65		2.9
Total of Places Line 1, 2, 3	14,112	47.4		15,658	52.6	
Died in County of Residence			83.4			71.6
Died Outside of County of Residence			16.6			28.4

*Other Long Term Care Facilities (LTCF) include Tuberculosis, Mental, Chronic, Penal Hospitals and Other Institutions.

NOTE: An additional 32 individuals died in doctors' offices and clinics in 1980. See Appendix B for exact distribution of place.

TABLE 3

PLACE OF DEATH ALL INDIVIDUALS AGE 65 & OVER IN NON-SMSA COUNTY IN WESTERN NORTH CAROLINA

Place of Death	1980 Number	1980 %-Total	1980 %-Place In vs Out	1983 Number	1983 %-Total	1983 %-Place In vs Out
1. Short Stay Hospital	71	62.3		45	43.3	
a. in county of residence	0		0	0		0
b. out of county of residence	71		100	45		100
2. Nursing/Rest Home & Other LTCF*	16	14.0		37	35.6	
a. in county of residence	0		0	26		70.3
b. out of county of residence	16		100	11		29.7
3. Home or Non-Institution	27	23.7		22	21.2	
a. in county of residence	27		100	21		95.5
b. out of county of residence	0		0	1		4.5
Total of Places Line 1, 2, 3	114			104		
Died in County of Residence		22.7			45.2	
Died Outside of County of Residence		76.3			54.8	

*Other Long Term Care Facilities (LTCF) include Tuberculosis, Mental, Chronic, Penal Hospitals and Other Institutions.

TABLE 4

PLACE OF DEATH ALL INDIVIDUALS AGE 65 & OVER IN A SMSA COUNTY IN WESTERN NORTH CAROLINA

Place of Death	1980 Number	1980 %-Total	1980 %-Place In vs Out	1983 Number	1983 %-Total	1983 %-Place In vs Out
1. Short Stay Hospital	630	57.		680	58.6	
a. in county of residence	566		89.8	632		92.9
b. out of county of residence	64		10.2	48		7.1
2. Nursing/Rest Home & Other LTCF*	277	25.1		254	22.	
a. in county of residence	259		93.5	241		94.9
b. out of county of residence	18		6.5	13		5.1
3. Home or Non-Institution	198	17.9		226	19.5	
a. in county of residence	196		99.	224		99.1
b. out of county of residence	2		1.	2		.9
Total of Places Line 1, 2, 3	1105			1160		
Died in County of Residence			92.4			94.6
Died Outside of County of Residence			7.6			5.4

*Other Long Term Care Facilities (LTCF) include Tuberculosis, Mental, Chronic, Penal Hospitals and Other Institutions.

NOTE: An additional 2 individuals died in doctors' offices and clinics in 1980.

APPENDIX A

MORTALITY IN N.C. BY PLACE

1983 AGE 65 & OVER

	SMSA		NONSMSA	
	Died in County of Residence	Died Outside of County of Residence	Died in County of Residence	Died Outside of County of Residence
0. Home or Non-Institution	2,572	36	2,724	61
Hospitals				
1. General	8,306	1,625	8,259	3,667
2. T.B.	0	1	2	10
3. Mental	18	18	39	34
4. Chronic	1	17	26	23
5. Penal	2	1	0	1
6. Veterans	246	185	0	342
7. Nursing/Rest Home	2,062	401	1,365	706
8. Clinics & Doctors Office	6	2	26	4
9. Other Institutions	31	11	42	23
	13,244	2,297	12,483	4,871 = 32,895

APPENDIX B

MORTALITY IN N.C. BY PLACE

1980 AGE 65 & OVER

	SMSA		NONSMSA		
	Died in County of Residence	Died Outside of County of Residence	Died in County of Residence	Died Outside of County of Residence	
0. Home or Non-Institution	2,105	36	2,198	65	
Hospital					
1. General	7,281	1,664	7,623	3,307	
2. T.B.	0	13	3	23	
3. Mental	5	32	57	34	
4. Chronic	0	17	30	38	
5. Penal	0	1	0	0	
6. Veterans	200	144	0	272	
7. Nursing/Rest Homes	2,139	421	1,253	693	
8. Clinics & Doctors Office	4	1	22	5	
9. Other Institutions	33	21	43	19	
	11,767	2,350	11,229	4,456	= 29,802

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